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07974, United States of America

**146 Buckingham Palace
Road, London SW1W 9TR**

(57) A flexible peripherally sealed plural compartment package 1 includes at least three compartments one of which, 18, is a mixing compartment. As described the package is provided with a barrier means dividing the interior space between the two walls of the package into three compartments. The barrier may be selectively ruptured in predetermined areas, e.g. 22, without rupturing the outer sealing walls of the package.



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FIG. 1

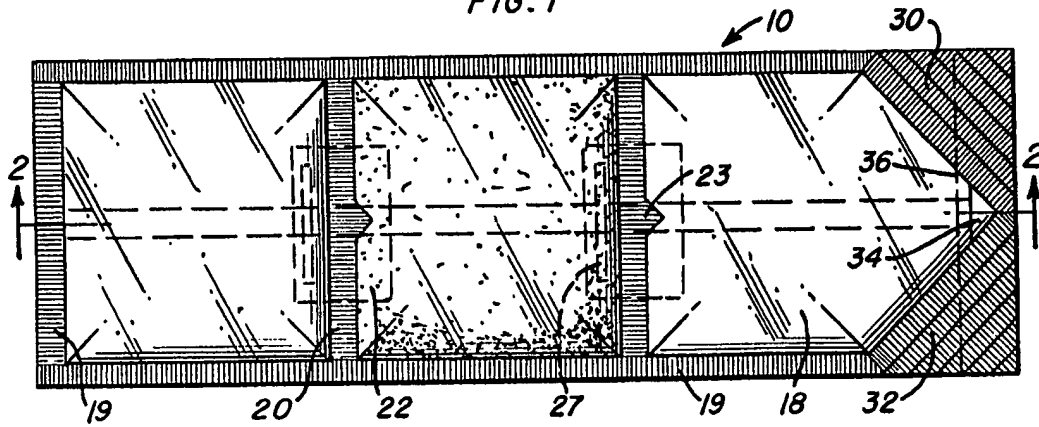


FIG. 2

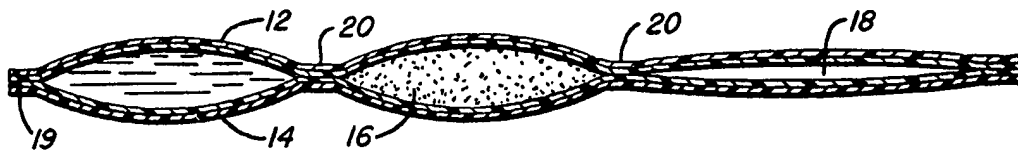


FIG. 3

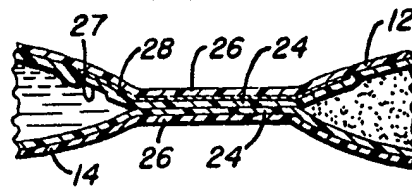
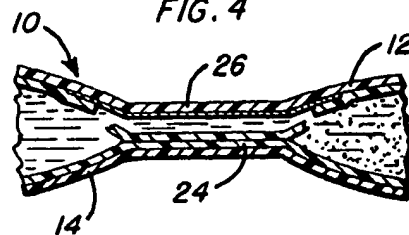


FIG. 4



SPECIFICATION

Plural compartment mixing package

Background of the Invention

The present invention relates generally to
 5 containers and packages made from thin, flexible
 sheet materials, and is more particularly
 concerned with packages having at least three
 compartments, one of which serves as a mixing
 compartment or chamber. The compartments are
 10 separated from each other and yet selectively
 placed in free communication with one another for
 transfer of products from two of the
 compartments into the mixing compartment
 without rupturing the outer exterior walls of the
 15 package, thereby permitting intermingling and
 mixing of the contents within the package.

In the prior art, packages having two
 compartments disposed on either side of a
 rupturable means separating the compartments
 20 from each other are well known. These packages
 are basically designed to hold two different
 substances, one substance in each of at least two
 compartments, isolated from each other so that
 the substances can be stored without
 25 intermingling. The substances in the individual
 compartments of the package may be in the form
 of flakes or other dry material in granular or
 powder form such as absorption dressing, or a
 liquid. In normal use, a package having a dry
 30 material in one compartment would be separated
 from another compartment containing a liquid. By
 breaking a suitable barrier separating the two
 compartments while maintaining the exterior
 walls of the package intact, the two substances in
 35 the two compartments are transferred from one
 compartment to the other for mixing. However,
 satisfactory mixing of the liquid and flakes usually
 cannot be achieved in a two compartment
 package because the gel, which forms as the
 40 water mixes with the flakes, traps dry flakes in the
 corners of the package. Kneading these flakes out
 of the corners produces dry lumps in the mixture.

Summary of the Invention

Thus, the principal object of the present
 45 invention resides in a novel package having a
 plurality of material containing flexible
 compartments and at least one separate mixing
 chamber or compartment.

Yet another object of the invention is in having
 50 a compartmentalized package of simple
 construction which can be produced commercially
 on available machinery without excessive changes
 or modifications.

In accordance with the above objects, there is
 55 provided a flexible plural compartment package
 for holding substances in separate compartments.
 The package comprises a pair of overlying walls of
 thin flexible sheet material joined together to
 define between the walls an interior product-
 60 holding space, each of said walls having a plurality
 of layers bonded together and at least one wall
 having a release area in which the bond between
 the adjoining layers is reduced in strength. Means

are provided for dividing the interior product-
 65 holding space into at least three compartments,
 one of which is a mixing chamber, said means
 comprising a seal joining together said walls and
 extending transversely across the package and
 crossing the release area. Materials may be placed
 70 in the compartments designed to hold same and
 by selectively rupturing the seal between these
 compartments at the release area, the materials
 therein are transferred to the mixing chamber.

In a preferred embodiment, the overlying walls
 75 each have heat sealable positive seals and a
 transverse breakable seal formed by the
 application of heat and pressure to the package
 walls. The sealing means extends across the
 package at its entire width, however, the
 80 transverse seal is less than the corresponding
 dimension of the release area so that the heat
 sealable layer can be ruptured at both sides of the
 transverse seal to establish communication
 between the compartments. The preferred sealing
 85 means as described herein is disclosed in U.S.
 patent 3,608,709, incorporated herein by
 reference.

In addition, the mixing chamber is provided
 with enlarged sealing areas on the opposite sides
 90 of a narrowed area or premeasured opening
 having a tear notch line for the release of the
 admixed materials from the container package.

Description of the Drawings

Other objects, advantages and features of the
 95 invention will be more fully appreciated upon
 consideration of the specification taken in
 connection with the illustrative drawings in which:

FIGURE 1 is a plan view of a filled package
 constituting a preferred form of the present
 100 invention;

FIGURE 2 is a longitudinal median section on
 line 2—2 of Figure 1;

FIGURE 3 is an enlarged partial fragmentary
 view of Figure 2 at the area of the transverse seal
 105 separating two of the compartments before
 rupture; and

FIGURE 4 is a view similar to Figure 3 after the
 inner layer has been broken to place two of the
 separated compartments in communication with
 110 each other.

Description of a Preferred Embodiment

Figure 1 shows a three compartment package
 10 for holding separate substances in separate
 compartments in conjunction with a mixing
 chamber compartment. The package comprises a
 pair of overlying walls 12 and 14 (Fig. 2) which
 115 are joined together, to define between the two
 walls an interior product-holding space 16. This
 interior product-holding space is divided into three
 separate compartments. One of the compartments
 is filled with a liquid and the other with a dry
 powder, as indicated in Figure 2. The third empty
 120 compartment as shown in Figure 2 constitutes the
 mixing chamber 18 of the present invention.

Thus, the preferred construction of package 10
 125 according to the preferred embodiment is realized

as shown in Figure 2, wherein the first chamber is filled with a liquid, the second chamber in series is filled with a powder such as an absorption dressing, and the third empty chamber is the mixing chamber.

As indicated previously, known mixing packages have inherent limitations in regard to the thorough mixing of fluent materials when one of the materials is in the form of dry flakes or powder. To avoid these shortcomings and insure more thorough mixing of the package contents, the three compartment construction of package 10, in combination with a suitable barrier means separating the individual compartment is provided.

The means defining the package interior comprises positive peripheral seals 19 and a transversely extending seal 20 joining together the two walls 12 and 14. In the embodiment illustrated, seal 20 extends beyond the limits of release area 22; however, area 22 may be enlarged to encompass the full width of the package to obtain an opening of maximum size between compartments.

The web stock from which the walls of the package in Figure 1 are made is a thin flexible sheet material. Broadly speaking, any suitable laminated material having two or more layers bonded together may be used, although for production reasons it is preferred to use a sheet material which is heat-sealable on one side. Typical of such webs are films of synthetic plastics, such as cellulose acetate or polyester, known as "Cellophane" and "Mylar," respectively, which are coated on one face with polyethylene, such coating or layer typically having a thickness of perhaps 1—3 mil. The "Cellophane" or "Mylar" provides an outer layer of relatively higher unit tensile strength but without thermoplastic properties. The polyethylene of the inner layer is a thermoplastic material which permits two overlying walls to be sealed together by the application of heat and pressure. Other materials for the inner sealing layer are various thermoplastic materials, such as vinyl or rubber-hydrochloride. It is also possible to use a laminated material which is not heat-sealing on one face, the seals referred to hereinafter being made with an applied adhesive; but it will be appreciated that most modern production machines are based upon a film which is heat-sealing on one side and consequently such web stock is preferred.

In utilizing the plural compartment package, the barrier between the two product containing compartments will be broken by the application of external pressure to the liquid-containing compartment, that is to the left-hand compartment in Figure 2. The external pressure applied to the liquid causes walls 12 and 14 to be spread apart adjacent central seal 20, thereby placing the inner layer 24 of wall 12 in tension. The spreading force is resisted at wall 14 by the full strength of layers 24 and 26 because of the bond between them. However, in wall 12, tension

ultimately occurs only in inner layer 24 because of the low value of the bond between layer 24 and a release coating 28.

This coating 28 may be any substance that operates to reduce the bond between inner thermoplastic layer 24 and other layer 26 of the flexible web stock. In the case of polyethylene extruded onto a "Mylar" base, this release coating can be a graphite base ink, a silicone compound, grease, or any other chemical that reduces to a suitable degree the bond between the two layers 24 and 26.

In order to facilitate initial rupture of the inner layer 24 it is preferred to provide stress-concentrating means adjacent central seal 20 at the side to be first ruptured. This stress-concentrating means may take many forms such as the triangular sealed area 23. In addition, a zone of weakness in inner layer 24 is provided as shown by the narrow elongated rectangle 27 in Figure 1. This zone of weakness is provided to insure that the inner layer 24 ruptures instead of being stripped off outer layer 26 of the package wall by the spreading force that is now exerted between the inner and outer layer of wall 12.

Consequently, the bond yields and the outer layer 26 then no longer supports inner layer 24 with the result that the inner layer ruptures adjacent central seal 20 as shown in Figure 4. Obviously the breaking point depends on both the bond with release coating 28 and the strength of the inner layer. The bond strength is maintained low enough so that it fails under stress, as described. Likewise the tensile strength of this inner layer is less than the strength of the bond between the two layers 24 in the area of central seal 20.

The pressure applied thus effects a spreading force which strips the layer 24 from release coating 28 and allows liquid to pass out of the left-hand compartment toward the right-hand compartment. This same liquid then applies tension force to layer 24 at the entrance to the second compartment, rupturing it at the right-hand side of the central seal 20 as shown in Figure 4, to establish free communication between the two compartments and a partial mixing of the contents of the compartments. The same process is followed to effect a rupture of the seal between the chamber containing the powder and the mixing chamber 18 as seen in Figure 2. In this manner the initial mixing can include a flushing of the "dry" components into the mixing chamber for a more complete interaction thereof with the liquid. If deemed necessary, a more thorough mixing can be accomplished through kneading of the package or moving the constituents from one end of the package to the other subsequent to initial mixing in the mixing chamber 18. The mixing chamber 18 is provided with enlarged sealing areas 30, 32 on the opposite sides of a narrowed area or spout 34. Enlarged sealing areas 30 and 32 are provided with a tear notch line 36 having perforations along the width of the sealing areas which may be torn to empty the admixed

contents of multiple compartment package 10 through the premeasured opening 34.

Thus, the invention provides a package for mixing and dispensing products contained therein without requiring contact between the products
5 prior to rupturing of the sealing means separating the individual compartments.

In addition to the package design and utility discussed above, it is also contemplated that the
10 mixing chamber may contain a medicament to be admixed with the substances contained within the remaining compartments.

Although a particular embodiment of the invention has been described and illustrated
15 herein, it is recognized that modifications and variations may readily occur to those skilled in the art, and consequently it is intended that the claims be interpreted to cover such modifications.

CLAIMS

20 1. A flexible plural compartment package for selective admixture of at least two fluent materials contained therein, comprising:

a pair of overlying walls of thin flexible sheet material joined together to define between the
25 walls an interior product-holding space;
means dividing the interior product-holding space into at least three separate compartments, one of which is a mixing chamber positioned for selective communication with the remaining
30 compartments, said means comprising a rupturable seal joining together said walls and extending transversely across the package whereby material transfer and admixture between the three compartments can be established by
35 selectively rupturing said seal thereby allowing the fluent materials to pass into said mixing chamber for admixture thereof.

2. A flexible plural compartment package for selective admixture of at least two
40 fluent materials contained therein, comprising:
a pair of overlying walls of thin flexible sheet material joined together to define between the walls or interior product-holding space;
means dividing the interior product-holding
45 space into three separate compartments, at least two of which are substance containing and one of which is a mixing chamber positioned relative to said substance containing compartments for selective communication with the remaining
50 compartments, said means comprising a

rupturable seal joining together said walls and extending transversely across the package whereby material transfer and admixture between the three compartments can be established by
55 selectively rupturing said seal thereby allowing the fluent materials to pass into said mixing chamber for admixture thereof.

3. A flexible plural compartment package according to claim 1 wherein said mixing chamber
60 remote from the remaining compartments includes enlarged opposed sealing areas defining a narrowed area, and a weakened line transversely thereof for enabling a severing of the walls to define a premeasured opening for the release of
65 said admixture.

4. A flexible plural compartment package according to claim 2 wherein said mixing chamber remote from the remaining compartments includes enlarged opposed sealing areas defining
70 a narrowed area, and a weakened line transversely thereof for enabling a severing of the walls to define a premeasured opening for the release of said admixture.

5. A plural compartment package according to claim 1 in which the walls include inner and outer layers with the inner layers heat-sealed together and the transverse seal formed by heat and
75 pressure.

6. A plural compartment package according to claim 1 in which the transverse seal is formed by an adhesive applied to one of said walls.

7. A plural compartment package according to claim 2 in which the transverse seal is formed by an adhesive applied to one of said walls.

85 8. A plural compartment package according to claim 5 in which a said adjoining layer includes a release substance defining a release area thereby reducing the bond between the adjoining layers.

9. A plural compartment package according to
90 claim 1 in which at least one end of the package is closed by a transverse seal generally parallel to the seal between compartments.

10. A plural compartment package according to claim 2 in which at least one end of the package is closed by a transverse seal generally parallel to the seal between compartments.
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11. A flexible plural compartment package according to claim 2 in which said mixing chamber contains a medicament to be admixed with
100 substances contained within said remaining compartments.